EOS Mission Support Network Performance Report

This is a monthly summary of EMSnet performance testing -- comparing the performance against the requirements. Currently using updated BAH requirements, including missions through 2006

All results are reported on the web site:
http://corn.eos.nasa.gov/performance/Net_Health/EMSnet_list.html.
It shows MRTG-like graphs of the performance to various test sites, including thruput, RTT, packet loss, and hops, with 1 week, 2 month and 6 month graphs.

Highlights:

- ERSDAC: flow became noisy and erratic on 12 November. Problem continues. Trouble ticket NOC0006198 issued.
- ASF: A problem began 23 October, dropping outflow from 3 mbps to 1.5 mbps, indicating that only a single T1 was effectively in use. The outflow problem was fixed on 1 November. However, the inbound flow became erratic at the same time, with a high packet loss rate. The inbound problem was not fixed until late November. A new problem with outflow from ASF began on 28 November, limiting thruput from ASF to a single T1. This was corrected on 5 December.
- NSIDC: Switched to a new host in November, which used full duplex Ethernet connection, rather that half duplex previously. Performance improved and stabilized as a result.
- Other test results were stable.

Ratings Changes:

Upgrades: ↑: None

Downgrades: ↓:
ERSDAC: Good → Low

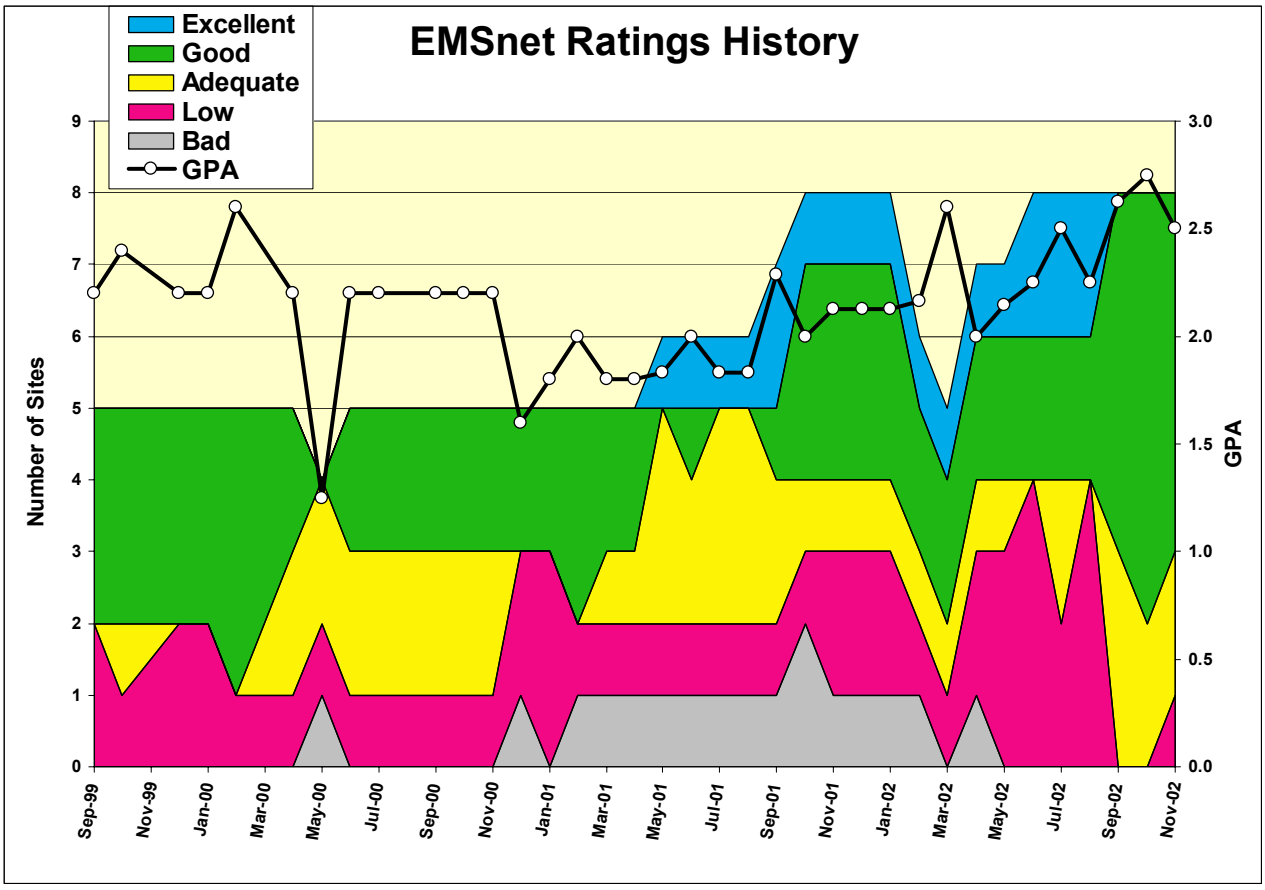
Ratings Summary:

Rating Categories:

Excellent: **Total Kbps** > Requirement * 3
Good: 1.3 * Requirement <= **Total Kbps** < Requirement * 3
Adequate: Requirement < **Total Kbps** < Requirement * 1.3
Low: **Total Kbps** < Requirement.
Bad: **Total Kbps** < Requirement / 3

Where Total Kbps = MRTG + iperf monthly average

The chart below shows the number of sites in each classification since EMSnet testing started in September 1999. Note that these ratings do NOT relate to absolute performance -- they are relative to the EOS requirements. The GPA is calculated based on Excellent: 4, Good: 3, Adequate: 2, Low: 1, Bad: 0



EMSnet Sites:

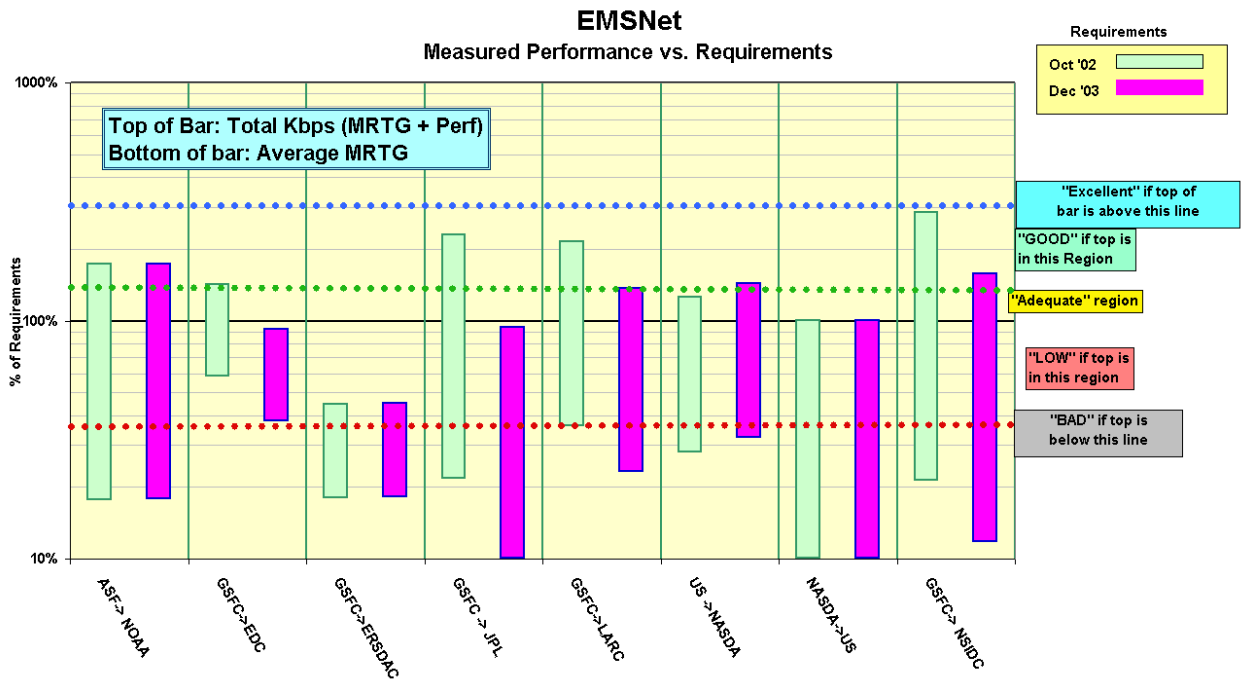
Network Requirements vs. Measured Performance

November 2002		Requirements (kbps)		Testing							
Source -> Destination	Team (s)	Current (Oct '02)	Future (Dec '03)	Source Node : Test Period	MRTG Avg kbps	Perf Avg kbps	Total Avg kbps	Current Status re Oct '02*	Prev Stat	Current Status re Dec '03*
ASF-> NOAA	ADEOS II	1613	1613	ASF->NESDIS: 01-Oct-02 - 28-Nov-02	285	2521	2806	GOOD	G	GOOD
GSFC->EDC	MODIS, LandSat	147233	227988	DOORS-EDCTest: 01-Nov-02 - 30-Nov-02	85800	124155	209955	GOOD	G	LOW
GSFC->ERSDAC	ASTER	467	467	GDAAC: 12-Nov-02 - 30-Nov-02	84	126	210	LOW	G	LOW
GSFC -> JPL	QuikScat, TES, MLS, etc.	2825	6894	CSAFS: 15-Aug-02 - 30-Nov-02	609	5904	6513	GOOD	G	LOW
GSFC->LARC	CERES, MISR, MOPITT	38346	59979	GDAAC: 18-Aug-02 - 30-Nov-02	13800	68603	82403	GOOD	G	GOOD
US ->NASDA	QuikScat, TRMM, AMSR	1854	1620	CSAFS: 23-Aug-02 - 30-Nov-02	519	1811	2330	Adequate	A	GOOD
NASDA->US	AMSR	1374	1374	NASDA-EOC: 01-Sep-02 - 30-Nov-02	106	1280	1386	Adequate	A	Adequate
GSFC-> NSIDC	MODIS	29249	53111	GDAAC: 05-Nov-02 - 30-Nov-02	6206	77353	83559	GOOD	G	GOOD

Notes:	All flow requirements listed are the greater of inflow or outflow		**Ratings**			
	Flow Requirements (from BAH) include TRMM, Terra , Aqua, QuikScat, ADEOS II		**Summary**	vs Oct '02		vs Dec '03
				Score	**Prev**	**Score**
***Criteria:**	**Excellent**	**Total Kbps** > Requirement * 3	**Excellent**	0	0	0
	GOOD	1.3 * Requirement <= **Total Kbps** < Requirement * 3	GOOD	5	6	4
	Adequate	Requirement < **Total Kbps** < Requirement * 1.3	Adequate	2	2	1
	LOW	**Total Kbps** < Requirement	LOW	1	0	3
	BAD	**Total Kbps** < Requirement / 3	BAD	0	0	0
			Total	8	8	8
	Change History:	27-Sep-99	Original - TRMM, Terra, and QuikScat			
		19-Jan-01	Incorporated BAH requirements including additional missions			
		9-Apr-01	Updated BAH requirements	**GPA**	2.50	2.75	2.13
		4-Jun-01	Added 50% contingency to BAH requirements			
		16-Nov-01	Added MRTG to Iperf, updated requirements, Revised criteria			
		2-Oct-02	Updated to revised BAH requirements			

Comparison of measured performance with Requirements:

This graph shows three bars for each destination. Each bar uses the same actual measured performance, but compares it to the requirements for two different times (Oct '02, and Dec. '03). Thus as the requirements increase, the same measured performance will be a bit lower in comparison.



Note: this chart shows that the performance to most sites is remarkably close to requirements. In the past, some sites have had performance way above the requirements, others way below. But now there are NO sites rated “Excellent” or “Bad” – ERSDAC is now “Low”, and the rest all are either “Good” or “Adequate”!

Also note that the interpretation of these bars has changed from Sept '01. The bottom of each bar is the average measured MRTG flow to that site (previously daily minimum). Thus the bottom of each bar can be used to assess the relationship between the requirements and actual flows. Note that the requirements include a 50% contingency factor above what was specified by the projects, so a value of 66% would indicate that the project is flowing as much data as requested.

Details on individual sites:

1) ASF ←→ CONUS: Rating: Continued Good

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/ASF-EMS.html

Test Results:

Source → Dest	Medians of daily tests (kbps)				
	Best	Median	Worst	MRTG	TOTAL
ASF → NESDIS	2558	2521	731	285	2806
ASF → GSFC-CSAFS	2589	1816	739		
GSFC-CSAFS → ASF	907	201	22		

Requirements:

Source → Dest	FY	mbps	Rating
ASF → NESDIS	'02, '03	1.61	Good

Comments: The 2.8 mbps total is very good for a 2 * T1 (3.1 mbps) circuit. Since this is more than 30% over the Oct '02 requirement, the rating is "Good".

A problem with outflow from ASF began on 28 November, limiting thruput from ASF to a single T1. This was corrected on 5 December.

More significantly, however, was a drop in ASF inflow capability which occurred on 23 October 2002. Although there have been some periods of recovery since that date, performance remains erratic, with a high error rate.

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2) GSFC → EDC: Rating: Continued Good

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/EDC.html

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	MRTG	TOTAL
DOORS → EDC Test	225.8	124.2	72.6	85.8	210.0
DOORS → EDC DAAC	201.9	139.2	63.6		
G-DAAC→ EDC DAAC	157.7	84.5	36.6		

Requirements:

Date	mbps	Rating
Oct '02	147.2	Good
Dec '03	228.0	Low

The three test cases above continue to show the effects of the DAAC firewalls: the test shown on the top row has no firewalls in the path, just vBNS+. The next test goes through the EDC firewall, and the last test goes through both the GSFC and EDC firewalls. The firewalls thus do appear to have a significant impact on performance – at least at these high rates.

This month the user flows were a bit higher than last month, but the corresponding thruput tests were a bit lower, with the total about the same. The combined MRTG + thruput remains 30% above the Oct '02 requirement, so the rating is still “Good”. But performance is still below the Dec '03 requirement.

3) JPL: Rating: Continued Good

Web Pages:

http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-SEAPAC.html
http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-PODAAC.html
http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-TES.html

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	MRTG	TOTAL
GSFC-CSAFS → JPL-SEAPAC	6.1	5.9	3.8	0.6	6.5
LaRC DAAC → JPL-TES	6.0	5.9	4.4		
GSFC DAAC → JPL-TES	20.5	16.5	8.0		
GSFC-MTVS1 → JPL-PODAAC	6.0	5.8	4.8		
ASF→ JPL-SEAPAC	2.8	2.7	1.3		

Requirements:

Source → Dest	Date	mbps	Rating
GSFC → JPL combined	Oct '02	2.82	Good
GSFC → JPL combined	July '03	7.40	Low
LaRC DAAC → JPL-TES	July '03	4.58	Good

The GSFC-JPL requirement above was revised in August revised to include all flows on the GSFC-JPL circuit, including flows from LaRC and flows to NASDA and ASF. The rating is based on testing via EMSnet from CSAFS at GSFC to SEAPAC at JPL. Note that the MRTG value above also includes these flows. However, MRTG data for GSFC → JPL is unavailable for November, so the September value will be used here instead.

Performance on this circuit has been stable since the BOP switchover on 15 August '02. With the combined requirement of 2.8 mbps, the performance continues to rate as "Good". Adding in the 4.6 mbps of Aura requirements from LaRC, the performance is below the combined 7.4 mbps requirement next July.

Performance from LDAAC to JPL-TES also improved from 2.9 to 6.0 mbps on Aug 15 due to BOP.

The route from GDAAC to JPL-TES and JPL-PODAAC is still NISN SIP (since May 8). The issue is that production and user flows cannot be separated by destination address, due to JPL's network architecture. JPL assigns only a single address to each node. Other DAACs have distinct internal and external addresses, which allows the production data to be sent to them on EMSnet, and user data via NISN SIP. Since the combined production and user flow exceeds the EMSnet requirement (based on production flow only), EMSnet does not have the capacity to support both. Thus the production flows are currently routed over SIP, which has higher capacity.

EMSnet testing to JPL-PODAAC is performed from MTVS1. Performance has been steady at 6 mbps since the BOP upgrade on 15 August.

ASF → JPL-SEAPAC thruput was steady at about 2.7 mbps, using the 2 T1s. A problem with outflow from ASF began on 28 November, limiting thruput from ASF to a single T1. This was corrected on 5 December.

4) GSFC → LaRC: Rating: Continued Good

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/LARC.html

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	MRTG	TOTAL
GDAAC → LDAAC	88.5	68.6	37.3	13.8	82.4

Requirements:

Date	mbps	Rating
Oct '02	38.3	Good
Dec '03	60.0	Good

Performance was stable this month, still rated "Good" vs. both the Oct '02 and Dec '03 requirements.

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5) NSIDC: Rating: Continued Good

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/NSIDC-EMS.html

GSFC → NSIDC Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	MRTG	TOTAL
GSFC-DAAC → NSIDC	89.1	77.4	42.4	6.2	83.6

Requirements:

Date	mbps	Rating
Oct '02	29.2	Good
Dec '03	53.1	Good

After the discovery on 22 October, that FEWER parallel TCP streams would improve thruput, it was determined that the host being used for testing at NSIDC was connected by a half-duplex Ethernet connection, which was limiting performance. So in November, testing was moved to a host at NSIDC with full-duplex connection, and performance improved further (total was 58 mbps last month). The Dec '03 rating improved to "Good" (was "Adequate").

Other Testing:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	Requirement	Rating
JPL → NSIDC-SIDADS	5.56	4.03	3.06	0.26	Excellent
LDAAC - NSIDC	6.13	6.11	4.50		

Performance is very steady from both sources. Thruput from LDAAC jumped to about 6 mbps on 31 October, but dropped back to 4 mbps on 28 November.

6A) US → NASDA:

Rating: Continued **Adequate**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/NASDA-EMSnet.html

Test Results:

Source → Dest	Medians of daily tests (kbps)				
	Best	Median	Worst	MRTG	TOTAL
GSFC-CSAFS → NASDA-EOC	2159	1811	557	519	2330
ASF → NASDA-EOC	2248	2003	628		

Requirements:

Source → Dest	FY	kbps	Rating
GSFC → NASDA	Oct '02	1854	Adequate
GSFC → NASDA	Dec '03	1620	Good

Performance steady -- about as expected for the 3 mbps ATM PVC (using multiple TCP streams to mitigate TCP window size limitation at NASDA). Added testing from ASF to NASDA – results about the same as from GSFC.

6B) NASDA → US:

Rating: Continued **Adequate**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/GSFC-SAFS.html

Test Results:

Source → Dest	Medians of daily tests (kbps)				
	Best	Median	Worst	MRTG	TOTAL
NASDA-EOC → GSFC-CSAFS	1395	1280	605	106	1386
NASDA-EOC → JPL-SEAPAC	2328	2288	1199		

Requirements:

Source → Dest	FY	kbps	Rating
NASDA → GSFC	'02, '03	1374	Adequate

Performance continues stable on new circuit. Performance to GSFC is still limited by the TCP window size on NASDA's test machine. NASDA has installed updated scripts, but has not begun using multiple TCP streams – expected to improve thruput. Testing from NASDA to JPL-SEAPAC shows the capability of the circuit – window size is less of a limitation since the RTT is lower.

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7) GSFC → ERSDAC:

Rating: ↓ Good → **Low**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/ERSDAC.html

GSFC → ERSDAC Test Results:

Test Period	Medians of daily tests (kbps)				
	Best	Median	Worst	MRTG	TOTAL
12-Nov-02 – 30-Nov-02	652	126	26	84	210
4-Jun-02 – 11-Nov-02	795	771	460	73	844

Requirements:

Source → Dest	FY	kbps	Rating
GSFC → ERSDAC	'02, '03	467	Low

Performance using the 1 mbps ATM connection (since June '02) had been very stable until November 12, when performance became noisy and erratic. The rating drops to "Low".